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ABSTRACT

This issue of "Library Lectures" contains lectures nineteen, twenty and twenty-one. Lecture nineteen, "Librarianship Today - Crisis or Change," presented by Dr. Jerrold Orne considers change a natural result of growth which should not be feared as a critical disruption. The twentieth lecture, "Twentieth Century Scholarship and the Research Library: A Marriage of Convenience," given by John H. Berthel, serves to remind librarians of the necessity for intensive dialogue between scholarship and the research library in the face of continually expanding knowledge. In the concluding lecture, number twenty-one, entitled "Automation and the Academic Library," W. Carl Jackson provides a sensible outline for implementing the changes brought about by automation which are destined to affect all libraries. (Author/NH)

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University of Tennessee

LIBRARY LECTURES

numbers nineteen, twenty, and twenty-one

1967-1969

EDITED BY ROBERT J. BASSETT

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FOREWORD

In 1967, The Shoe String Press, Inc., brought together the first eighteen University of Tennessee Library Lectures in a volume entitled *The Library in the University*. The present book continues that compilation of viewpoints of eminent librarians with Library Lectures nineteen, twenty, and twenty-one.

Dr. Jerrold Orne, Librarian, The University of North Carolina, delivered the nineteenth lecture, "Librarianship Today—Crisis or Change," on April 4, 1967. In a sense, Dr. Orne provided the theme for this collection; that is, change should be considered the natural result of growth and ought not be feared as a critical disruption.

The twentieth lecture, "Twentieth Century Scholarship and the Research Library: A Marriage of Convenience," was given by John H. Berthel, Librarian, The Johns Hopkins University, on May 7, 1968. Mr. Berthel reminded us of the necessity for intensive dialogue between scholarship and the research library in the face of continually expanding knowledge.

In concluding this volume, it seems appropriate that the twenty-first lecture, presented by W. Carl Jackson, Director of Libraries, The Pennsylvania State University, treated the challenge of the machine. On April 22, 1969, Mr. Jackson's contribution, "Automation and the Academic Library," provided a sensible outline for implementing these changes which are destined to affect all libraries.

Robert J. Bassett

May 1, 1969

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UNIVERSITY OF TENNESSEE LIBRARY, APRIL 4, 1967

By Jerrold Orne

Librarian
The University of North Carolina

Librarianship Today—Crisis or Change

A few months ago I received a business letter from an organization called the Council for Management of Change, Inc. This new firm is offering (for an outlandish sum) a periodic news letter entitled *Innovation and Management of Change,* advising its clients of notable events which will result in change and telling them how to prepare for it. This service is simply a high-priced, top-business management version of a recent journal called *Changing Times,* which now enjoys an extensive subscription list. These are only two illustrations of the mode of our time; they could be multiplied without great effort. Obviously change is a vital part of our way of life.

The word "crisis" is now applied to current problem areas throughout our society. Libraries are not exempt. We have a seeming crisis in personnel, in methods, in volume of materials, in costs; in fact, almost every aspect of our work is referred to as a crisis by someone. The crisis is usually blamed on some kind of "explosion." These are pretty violent terms; it will be my purpose to look more closely into their appropriateness in the environment which encompasses us today.

Let us look first at the basic content of the library, its books, journals, and information resources of all kinds. Fifty years ago a library in our country had books, periodicals, and possibly a

few newspapers. In the class of other "information resources" one might have found some stereoscopic views and viewers. Government documents were provided in a few of the larger libraries, but their numbers were not overwhelming. There were not so many publishers and consequently fewer books published. Many of our sciences were at a primitive stage; the social sciences were being born and the humanities followed traditional lines. Libraries were seeking readers, promoting the use of libraries along with universal education, and the profession of librarianship was in its infancy.

If you stand this sketch beside the present-day array of facilities, the contrast is stunning. If Melvil Dewey could return to see the collections of one of our medium-sized public or academic libraries, it would be difficult to convince him he was not in the British Museum. There are now scores of libraries possessing over a million volumes. Large libraries and many small ones have to deal with a broad range of materials, of which books and journals are only a part. Microfilm, microcard, microfiche, copyflow Xerox, and a multitude of varied photocopy forms now abound in our libraries. Phonodiscs are now supplemented by magnetic tapes. Magnetic tapes are now used for reproducing new copy by computer-activated printers, and great efforts are now mounted to achieve universal availability of library resources by remote access devices. It appears likely that it is only a matter of time before the total library resources of our country can be available to all, no matter where the original piece is located.

Considering only this rapid review of two periods of time, let me ask, "What have we here, crisis or change?" In the volume and character of library materials and operations, we have considerable change, but in my view, no crisis.

As the volume of library material has increased, however, and in keeping with the accelerated tempo of our time, the more slowly developing techniques of acquiring and preparing these materials for use have often invited the cry of crisis. The buying of books when they were fewer in numbers and from fewer sources was a relatively simple matter. Transportation and communications were slower and there was less pressure to get books fast. Fewer books were bought abroad and most of them from countries with well-developed book-trade channels. Journals were

not so numerous, nor were they as costly as they now are. The few foreign titles acquired were fairly stable in production and delivery. Sources were usually well-known and dependable. Most libraries provided a few local or regional newspapers and one or two of national character, such as the *New York Times.* It was a rare library that sported half a dozen newspapers in a foreign tongue. Since there were no other materials then of any great consequence in libraries, the methods of acquisition were simple and direct. Again, there was no intense pressure of speed or variety; old-timers who still remember that period will no doubt think of it as a golden era.

Today the acquisitioner has a far more complex task. For printed materials, he must be prepared to search sources in any one of a hundred languages, published in countries where bibliographic tools are primitive or do not even exist. He must struggle with book-trade sources where the book-trade is not organized, either for publication or distribution. As if this were not enough, he has to cope with a mass of reprint and near-print publications produced by hundreds of little-known sources well off the beaten path of standard supply. He must be prepared to acquire new forms of material, such as photocopies, microforms, pamphlets, tapes, visuals of all kinds, and audio materials.

The complexity of this function is enough to paralyze the will to action, but there have been massive changes in the tools to facilitate the action. Domestic or even all English-language bibliography is virtually complete and up to date. The early, limited issues of the *Cumulative Book Index* are now massive compendia of current publication. They are supplemented by a number of monthly bibliographic journals and announcement lists that literally blanket current English-language production. The retrospective literature of all countries is broadly represented in the great series of printed catalogs published by the Library of Congress, the British Museum, and the Bibliothèque Nationale. There are now many more and better national bibliographies produced in other countries. More recently the numerous photo-offset printed catalogs of great subject libraries have given yet another dimension to bibliographic access in our country. The proliferation of printed subject bibliographies has been just as rapid. Guides to other forms of material are already at hand. Machine methods and new business devices are now

commonly found in larger libraries to further simplify operations and increase the speed of handling as the flow of materials increases. This combination of improved methods and resources has in fact enabled the libraries to keep up with the rapidly expanding levels of production. What might have led to crisis has in this area led to considerable change, no more.

Now, this expanding production also developed an almost incredible series of economic problems. The ordinary trade book which libraries used to buy for four dollars now costs six or seven, and the annual production of books from which the library must choose has doubled in the last ten years. Periodicals are now being born in numbers estimated variously at fifty to one hundred a week, and those to which we now subscribe have increased in cost from fifty to three or four hundred percent. Clearly, it costs a lot more in dollars to maintain and build a good library today. The paperback book came into its own, first as a means of reducing costs for the mass of book-buyers, but then as another way of reducing overall production costs for a very broad range of titles. There has been a rapid proliferation of abstract journals, indexing services, and other new types of information access tools resulting from increasing difficulty in keeping up with the contents of all these journals. By Herculean effort, the already great union lists of serials in American libraries have been supplemented and brought up to date by national guides such as *New Serial Titles* and the new edition of the *Union List*. Many other state and regional lists have also come into being. There has been no single tool representing monographic literature in a union list, but the publication in book form of catalogs representing many great specialized collections has helped considerably in establishing locations. There is, in fact, a definite program to publish the entire retrospective national union catalog in book form within the next ten years; this will provide virtually complete bibliographic access to libraries all across the land. What then is the situation so far as cost of materials is concerned? We are spending a great many more dollars; there is no doubt about that. These dollars are worth less but we do have larger budgets to go with the times and their value. The book industry, the community of users and the library profession have combined their efforts to provide extensive bibliographic access to a world of material which no

single source can supply. Once more solutions have been found and are being developed to convert crisis into manageable change.

One area most vulnerable to the clarion call of crisis is our highly developed cataloging system. Without dwelling on historic beginnings, compare the compact little volume of 88 pages representing the 1908 cataloging code with its current successor in 400 pages, containing hundreds of rules and variants. Compare the first edition of Dewey in 42 pages, including the introduction, and the latest in two thick volumes. The early Library of Congress subject heading lists are quite different from the last. The first edition in 1914 provided some 40,000 entries; the 7th edition now includes over 200,000. And you know, of course, that with all this esoteric apparatus, we are continually blamed for not providing depth or swift enough access to the contents of the materials cataloged. Not only don't we do it well enough, but the volume is certainly beyond what any one institution can manage. It is indeed ironic that this field should be eligible for our crisis category, when in fact our system is widely believed to be decades ahead of that of any other country and is avidly studied by troupes of foreigners who come to our schools to learn. For many of these foreigners, librarianship is cataloging. Some of our own professionals hold the same view, and it is they who may be most responsible for creating the crisis. Cataloging is one aspect of library work which appeals especially to those of our staff who are at the same time the most intelligent and most dedicated to a level of perfectionism which defies rationalization. In consequence, many library administrators found themselves amid growing stacks of uncataloged books on the one hand, and a thoroughly intransigent but dedicated catalog staff on the other. The very quality of their product, deprecated though it might be in some quarters, betrayed them. Some middle ground was obviously needed. Though possibly not always recognized as such, the concept of the unit card was the first real effort to ease the difficulty. With the unit card, distributed by the Library of Congress, the full range of the national library's cataloging could be adopted by anyone who uses Library of Congress cards. The next step was the idea of a cooperative cataloging project feeding into the Library of Congress and thence to all users. Consciously or not the beginnings

of the National Union Catalog also represented another related effort. The later provision of catalog copy by the National Agricultural Library and the National Library of Medicine also became of increasing importance to the plan. When finally the card distribution system, supplemented by the printed book catalogs of the Library of Congress, was brought to virtually current status, the full circle of catalog guidance seemed complete. It was at this point in time that new crisis appeared to frustrate the best laid plans of catalogers and administrators of libraries. The rapidly changing political scene in a multitude of smaller countries all over the world brought with it a powerful compulsion to acquire the world's product of publication for our country's use in coping with this kaleidoscopic change. The result for libraries was a babel of little-known languages, diffuse and undependable sources of supply, and inadequate resources, both economic and professional, in our own library world. Crisis was fast coming up when a joint operation of the Association of Research Libraries and the Library of Congress led to the initiation of the Title II-C program in the Library of Congress. Implementing an ingenious system of shared acquisition and cataloging, the Library of Congress now supplies thousands of new cards weekly for a "Control File" in each of the large research libraries of this country. Thus, in one sub-system, what looked like a crisis in cataloging looming up close by was converted to a sizeable change in method, once more a measure of change, not crisis.

Now the catalogers in this audience are thinking, "What about the new rules, which are impossible for our catalog, and what about the new edition of Dewey, which offers more problems with each edition, and what about the numerous large libraries now converting to L. C. classification? If this isn't crisis, then I don't know a chicken when I see one." Can this be measured as crisis? Or is it merely change? This is, I'll be quick to grant, one area of library work which comes closer to crisis than many other areas we consider here. In simple fact, the massive application of the sharpest intelligence in our profession to the intricacies of cataloging and classification and the intensity of this attack may have betrayed us. Each successive edition of increasingly complex rules has met the solid reaction of administrators and consumers. What happens now in these areas is a complex but irresistible adjustment (or

change) to meet the demands of our own time. And it is to the credit of those highly intelligent professionals within our staff that such massive change can be assimilated. We are compelled to be more realistic in categorizing levels of processing need and in eliminating many less than critical refinements. There is steadily increasing acceptance of a reasonable level of cataloging and standard classification which alone can enable us to manage the impressive numbers we must now face.

Thus, in cataloging, as in other fields, we have encountered crisis, only to see it resolved into extensive change. It is not my purpose here to debate the quality of the change, whether good or bad. The important point is to recognize that a significant change is being made, and that the profession is finding reasonable solutions to its problems.

Now, it would be impossible to discuss crisis or change in our field without at least a nod to the machines. The world of computer technology has eagerly revealed its wonders to librarians; most librarians have been somewhat less responsive. From the modest beginnings of the first Hollerith punched cards and the collator, we have grown to the availability (?) of a complete computer-based system, capable of delivering in microseconds what some libraries needed months or years to do in other times. We are tantalized by visions of instant delivery by wire of complete and apt cataloging data for any book we acquire, of detailed analysis—sentence by sentence or word by word—of the contents of any of these books, of verbal communication with any library bookstock in the country and telefacsimile delivery of exactly what is wanted, and a host of other highly sophisticated yields going far beyond our present capacities. For some librarians these visions, converted to hard cash costs, have become nightmares of large commitment and small delivery. For some, the rugged determination of which is the tail and which is the dog might be aptly termed a crisis. Ponder on this for a moment, and remember that we have been actively plunging around in this area for some twenty years now; it is indeed difficult to contend that any crisis situation can endure for twenty years. I remember well a time when my late good friend, Mortimer Taube, said to me in all seriousness that the machines would replace libraries. He cried "crisis," and others have banged the same bells, but what has happened and

what is happening is no more than a solid, useful climate of change.

Librarians have welcomed the potential benefits they see in the machines. They have patiently and earnestly sought guidance in myriad seminars, short courses, and lectures on the use of machines. They have been thoroughly exposed to the purveyors of machines and to the ever-increasing band of consultants and consultant firms. Our professional meetings always include extensive programs designed to keep us all informed of the newest and best developments to date. And out of this welter of words and experiments has come a modest, slowly but surely developing series of useful additions to the technology of librarianship. We have now a basic mechanized circulation system in use in a number of libraries. Many business operations are already machine-oriented in some libraries. Certain types of bibliographic records have been successfully converted to machine manipulation. In these and other still experimental efforts there is ample evidence of change. How far this change can go is still anybody's guess, but there is already enough to make the case. Once more the talent of sound professionals has converted what might have become crisis to the precise extent of change that was needed.

In a quite different aspect of our work, we come very close to losing our now evident pattern of either-or, crisis or change. In the normal approach to book selection, we often seem to be having one long continuous series of crises growing out of censorship in one form or another. To be sure, this is not exclusively a library problem, but libraries are often the prime targets. Book publishers, distributors, booksellers, and even authors are also on the spot. Appeals to prurience are only one cause of censorship; libraries have always been traditional targets for political, religious, and other pressure groups with something less than the most altruistic purposes. Not only our professional literature but the daily press and other channels of public communication are filled with lurid details of legal battles over questions, however disguised, of simple censorship. The tradition and stability of librarians facing these attacks has been most effective. In a few isolated cases, where prejudice and passion have prevailed, libraries or librarians have been reversed; but for the most part these intermittent crises

have been restrained, and the change we mark here is a change in the growing acceptance of the library as an unbiased source of information, a bulwark of the experimental in literature, and a fierce fighter for freedom of access. There is change, for every time a library or librarian wins out in defense of this freedom the principle is reinforced. Since these small crises (even though they may not seem so small at home) have occurred so frequently, the end result is fairly massive change in the understanding of the library's place in this pattern.

Another area of our work rife with thorny problems grows out of the ever-present battle of numbers. Although most of us growing old in the profession can hardly remember a time when we had enough space, it is certain that our present service demands far exceed our physical resources. The enormous increases in numbers of school children found their counterpart in strain in the public libraries after school hours. The changing aspect of urban life in our time has also left its mark on public library service facilities. The massive central library of a large city is now usually a minor part of the public service space. Suburbanitis has led to the rapid proliferation of branch libraries, traveling libraries and a wide range of dispersed service units. The main library is largely a warehouse and distribution center, providing limited services to a restricted public while the outlying units account for the large numbers. In many rural areas, extension services are organized cooperatively around one basic, geographically central distribution point; in effect the library seats have been dispersed into the home.

Academic libraries in urban communities are also involved to a degree which often imposes new restrictions on use. Academic libraries find it difficult to provide enough seats or services for the vast numbers of new college students in the early years, and research-type library space is exhausted long before the demand is filled. Their space problems are quite different from those of the public library and the same solutions do not serve. The patrons of academic libraries are on hand for many hours, throughout a long, daily schedule; some of them spend more time in the library than in their dormitory. In addition, depending upon availability or non-availability of other casual-use facilities, the library may serve as the primary focus of social activities, whether it likes it or not. Depending upon the

nature and provision of other study resources, the library may serve more as a study hall than a library. All of this has had a powerful effect on library building both in quantity and design. New libraries are being built in astounding numbers throughout the land. Not since the days of the historic Carnegie grants has there been such a flowering of new library buildings. The character of these buildings is quite different from earlier libraries; they are now seldom monumental in design, and always aim to provide maximum reader space. In larger institutions there is a noticeable trend to separation of types of users and the design of special space arrangements for each. This is readily seen in the undergraduate libraries, in the multiplication of individual, carrel-type seats, and in the wholesale supply of faculty studies and individual graduate student space. These are only a few of the most striking changes we note; once more we must weigh the cause. Is it crisis, or normal change? I suppose there is by definition nothing in the world more adaptable to its time than architecture. The very definition of the art is that it must fit its time and function, and as the needs change, so building design must change with them. Depending upon where you stand, you may feel that nothing less than crisis can describe your woes, or you may be able to hold on until your particular crisis resolves itself in adaptation to recognized change. For most of us, though we often think our needs are far too slowly met, we know they are met one day and in ways that take into account the then clearly recognized change.

Closely allied to library building is the character of equipment used in our libraries. Three or four decades ago library equipment was just coming into its own, and three or four suppliers provided ninety percent of it. These few manufacturers laid great stress on the durability of their products and, in fact, a library table or chair was designed to last a lifetime in use. They were made as solidly as possible and what they may have lacked in esthetic grace was made up in sheer durability. In our time you will find scores of manufacturers and agencies vying for your library equipment order, offering a maximum of esthetic variety but not always the qualities of endurance we have had in other times. I need not belabor the point. What we have here again is the evolution of only one aspect of our materials.

A similar evolution has taken place in our staff and their approach to librarianship. In the early years professional librarians were few in numbers and modestly recognized. It took three decades to bring the library schools into academic acceptance, and their product was limited. Together with other evolving aspects of the profession, their numbers and stature increased, their public acceptance grew, and, with the massive expansion of education in recent years, their importance to our country's growth became more evident. Librarians today have a level of acceptance that speaks well for the future. Yet we hear notes of discord all around us. "There aren't enough qualified librarians." "The library schools aren't teaching them what they need." "They ought to teach them more about machines." "They ought to be training more subordinate staff." Do these rumblings forecast crisis? Are our professional schools doomed to failure or ineffectual purpose? For years we fought for academic acceptance. For another period of years we pushed the professional program to the Master's degree level and beyond. We now appear to be moving into an era of broadening the base of studies to encompass the so-called information sciences. Admittedly, this is a pretty rapid review of professional education, and one cannot paint a detailed panorama with a few bold strokes. Yet, leaping the decades, as I have done, still reveals no crisis; it does bring into sharp relief the nature of change in our field.

Perhaps by now you are convinced, as am I, that librarianship has not been in crisis, is not in crisis, and does not anticipate crisis. We are convinced that the markings of considerable change are evident in every aspect of librarianship, and that they evolve in an orderly, logical manner. At the same time, I should not fail to alert you to our American habit of shock for emphasis. You will be subject to this every day of your life; it is extremely important to understand it and not be shaken.

While writing this paper a new bulletin has just come to my desk announcing that the "World Crisis in Education" has been selected as the theme for an international conference on education called at the request of President Johnson. In announcing plans for the conference, the President said, "This international gathering of world educators and specialists will take a fresh look at the world's educational needs. I hope it will help the na-

tions to establish new priorities and new proposals for worldwide cooperative efforts in education." Now I don't quote President Johnson out of personal esteem for his importance as an educational planner, nor am I naive enough to believe he conceived or wrote the ringing phrases he uses. I cite this statement as a current example of crisis psychology, as an indicator of one trend which must inevitably enter our profession on a large scale. Librarianship, as well as education, has not a crisis, but the assurance of important change resulting from ever broadening vistas of international assimilation, promoted by many of the same factors which were cited earlier to account for other changes. Speed of communication, rapid transport, internationalization of industry, increasing acceptance of English as an international language, the mobility of populations, the tremendous growth of publishing—all of these things mark the opening of a new era. In our time the world is our stage and we must be prepared to perform on it. In a few words, then, this is not crisis, it is change—at a pace and to a degree we can manage, but still much larger and more complex than what we have known.

As our profession grows, it is only natural that it becomes more complex and difficult. But since we too grow more complex, and more difficult, it is my abiding faith that we can and will meet each small crisis in such a way that it is swiftly converted to wholly natural and wholesome change.

library lecture number twenty

UNIVERSITY OF TENNESSEE LIBRARY, MAY 7, 1968

By John H. Berthel

Librarian
The Johns Hopkins University

Twentieth Century Scholarship and the Research Library: A Marriage of Convenience

Perhaps the most striking characteristic of scholarship and the research library, as we know them today, is their relative youth. They were born less than one hundred years ago and almost immediately wedded.

Scholarship, which had largely been the domain of the amateur, became institutionalized in the last quarter of the 19th century.

A useful illustration of this revolutionary change in scholarship was the founding of The Johns Hopkins University in 1876. This was not the first institution in the country to introduce graduate programs, but it was the first to provide doctoral programs throughout the full spectrum of its curriculum.

It is appropriate to the subject of this paper to record that the year 1876 also witnessed the founding of the American Library Association.

The introduction of graduate education in this country, bringing with it, as it did, interest in research and specialization, necessitated the development of a new type of library, one capable of catering to special subject field interests in depth, and equally capable of providing more sophisticated services and collections than had been the custom.

Higher education in the United States was never to be the same again. Graduate education and its partner, the research library, were to see to this.

The title of this paper is, "Twentieth Century Scholarship and the Research Library." Its sub-title, "A Marriage of Convenience," is added merely to remind us that the partnership, although an honorable one, has experienced, and gives signs of continuing to experience, the storms as well as the calms usually associated with the marriage union. My purpose is to examine some of the history of this magnificent partnership, not ignoring areas of stress, and to speculate about its possible future.

If we pause briefly to examine the 19th century institutions, out of which most of our present-day universities developed, it is like stepping into a different world.

Until the mid-19th century, most higher education in this country was provided by the one-curriculum college, wherein each student was required to attend the same courses throughout the four years of his residence. This core curriculum was dominated by study of the Greek and Latin classics, freshmen and sophomores of the day taking little else, and even upper college students devoting approximately half their time to these same disciplines.

Other subjects were offered, of course, including mathematics and the physical sciences, but these latter were valued primarily because they were believed to exercise the intellect and induce mental discipline. There was little or no laboratory work in the physical sciences and physics, itself, was taught as a deductive science.[1] Those occupying the seats of power in these colleges were generally unfriendly to science. For example, two now famous scientific schools—Lawrence at Harvard and Sheffield at Yale—were granted the privileges of birth only on the understanding that they accept a position on the extreme corporate fringes of those colleges.

What of libraries in this same period? It has been estimated that in 1850 the total resources of all institutional libraries in the United States were approximately 1,000,000 volumes.

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[1] Frank M. Albrecht, Jr., "The New Psychology in America, 1880-1895" (Ph.D. dissertation, Johns Hopkins University, 1960).

Today, in contrast, some 50 of the 79 libraries holding membership in the Association of Research Libraries boast collections of 1,000,000 or more volumes.

In 1850 the Library of Congress had 50,000 volumes. Today its collections are in the neighborhood of 50,000,000. In 1850 Harvard's library held 72,000 volumes, Yale's 21,000, and by 1857 Columbia proudly reported a collection of 18,000, Princeton 11,000, and Pennsylvania 5,000.[2] All of these are now, of course, multi-million volume collections.

What were some of the catalytic agents that contributed to this growth and change in scholarship, in higher education, and in the libraries developed to support the new scholarship? The agents were legion, and cause and effect inextricably intertwined. Only a few will be mentioned here.

Among these, however, I am fascinated by what I believe to be the influence of the Newtonian view of science upon these emerging universities. Increasingly over the preceding three centuries the tenets of mechanistic science had made their impress upon the minds of educated men.

If we oversimplify the meaning of Newtonian science, as many of its 19th century popularizers tended to do, and say it viewed the universe as a great machine, it is easy to see why it was argued that if individual minds were to explore fully the workings of particular parts of this great machine and develop models of these parts, then it would be possible, in combination with other minds, to put all the parts together into a meaningful whole, devise a master model, and thereby come to understand the meaning of the world and the universe around us.

Newton was much more humble in his expectations than were some of the 19th century workers in the science vineyard, and yet the whole three centuries of enterprise not only afforded man a magnificent dream, but also resulted in many useful accomplishments.

I have always suspected, without being sure the suspicion has any validity, that even though the experimental and lab-

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[2] Samuel Rothstein, *The Development of Reference Services through Academic Traditions, Public Library Practice, and Special Librarianship*, ACRL Monographs, 14 (Chicago, 1955).

oratory sciences were only grudgingly admitted to departmental status in the new universities that were evolving in the final quarter of the 19th century, those then in the seats of power must have been more deeply impregnated with the tenets of the mechanistic philosophy of science than they realized.

For once having admitted these sciences to departmental status, the direction taken by all university disciplines was toward compartmentalization and specialization.

The scholar-specialist as we know him today had been born and the word research took on new meaning.

Daniel Coit Gilman, the first president of The Johns Hopkins University, expressed this new meaning in 1898 in defining the functions of a university. After reviewing the more obvious responsibilities of these institutions he added the following:

> The third function of a university is to extend the bounds of human knowledge. Call it research, call it investigation, call it scientific inquiry, call it the seeking for truth—never has the obligation been so strong as it is now to penetrate the arcana of the world in which we dwell, to discover new facts, to measure old phenomena, and to educe principles and laws that were written in the beginning, but have never yet been read by the mortal eye.[3]

Gilman was a geographer but he spent some years of his professional life as librarian of Yale, where he constantly complained to the president of the impossibility of keeping the library warm in the winter months. These words of Gilman's provide an extremely articulate expression of the aims, purposes, and dreams of many of Newton's disciples.

This new scholarship resulted in new demands upon university libraries. Scholarship—institutionalized, research-oriented, pluralistic, and specialized in its interests—began to express a vastly increased regard for the value of libraries as a necessary partner. It was in this period that the phrase, now a cliché, was coined: "The library is the heart of the university."

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[3] Daniel Coit Gilman, "Higher Education in the United States," in his *University Problems in the United States* (New York, 1898).

The new scholarship not only resulted in demands for more varied and larger library collections but for easier access to these materials. An example of the latter is afforded in the changes made in the number of hours library doors were kept open to students and faculty. In 1876, Columbia's library was open 12 hours a week; in 1896, 72 hours. Harvard provided a somewhat more generous schedule, its library being open 48 hours a week in 1876, and 82 hours in 1896.[4]

The extension of these service schedules continues up to the present day. At Johns Hopkins the library is open 8:00 a.m. to midnight, 365 days a year, and the undergraduate library is actually open 24 hours per day during the school year, but only as a study hall from midnight to 8:00 a.m.

The new scholarship also encouraged an increasing liberality in lending privileges and in access to the stack collections.

Interestingly enough, in the past few years, and probably as a result of population pressures, competition for individual items in library collections, and an increasing incidence of vandalism, some voices have begun to urge that libraries adopt somewhat less liberal policies, particularly in respect to admission to the stacks. It is still too early, however, to predict whether or not this concern will lead to major changes in policy.

The seminar system, which also characterized the new scholarship, required first-hand investigation by students of original documents, under the watchful eye of the sponsoring professor. This made it obviously desirable to bring these three elements together: the professor, the students, and the books.

The merging of these three elements was apparently accomplished in several ways, depending upon conditions existing in particular institutions. Regardless of how the arrangement was originally achieved, the final product was the creation and development of the departmental library system as we know it today.

One of the earliest departmental libraries at Columbia, for example, the Classics Library, grew gradually out of the office bookshelves of the chairman of the Classics Department. The

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[4] Rothstein.

collection, having outgrown the space available to it, and having become somewhat cumbersome to oversee and keep in proper order, the responsibility for its care and management was transferred to the library.

Some of our departmental libraries grew out of seminar collections, and for the same reasons. Others were initially developed within the library when, at the request of a department, materials covering a particular subject were culled from the general collection and given special quarters in the appropriate academic building or in a room in the library set aside for the purpose.

Out of these relatively humble beginnings came, as I have noted, the departmental library system which still characterizes many of our university libraries.

These early efforts seem a far cry from the Harvard Library of today, which boasts not only a huge research collection in its Widener Library, but an excellent undergraduate collection in Lamont, and some 80 additional departmental, school, and reading room collections.

No one convinced of the values to be derived by mankind from higher education can review the 90-year partnership of American scholarship and the research library without experiencing a thrill of excitement. And yet, the very success of this mutually shared adventure has resulted in a variety of stresses and strains and, occasionally, periods of disenchantment on the part of one partner or the other. The marriage, although amazingly successful overall, has not been idyllic. The precise causes of these difficulties are not always readily apparent to either partner, but frequently are a reflection of the increasing complexity of the university, the corporate entity, both partners are dedicated to serving.

It has proved relatively easy, in the course of the past 90 years, to describe in broad terms the aims and purposes of a university. Yet, I doubt, if the question, "What is a university?" has ever been fully answered except in the minds of individuals. We are, for example, confronted by a variety of conflicting

definitions at this moment in our history, including the ones being voiced by student activists.[5]

I noted earlier that one of the striking characteristics of the new scholarship was the emphasis it placed on specialization and investigation in depth. Perhaps in our attempts to answer the question, "What is a university?" we have, until quite recently, accepted too readily, as did the 19th century protagonists of mechanistic science, the belief that when all these different parts (special interests of scholarship) are totaled up they result in a meaningful whole, a sort of master model of what a university should be and, hopefully, is.

This optimistic view has been seriously shaken in the past twenty years, and for a variety of reasons, as was the Newtonian world view by the rise of the new physics at the opening of this century. Indeterminism and relativity suggested a more complicated universe than that conceived of by mechanistic science.

In the last twenty years a growing number of friendly critics have remarked on what they see as an excessive emphasis on specialization and compartmentalization in our universities. One of the more literate expressions of this criticism was that of John Herman Randall, Jr., professor of philosophy. In a paper, published in 1955, he wrote as follows:

> As reflected in the microcosm of the modern university, the world of knowledge has today become radically plural. It is a world of many different knowledges, pursued in various ways to diverse ends. These many inquiries are normally carried on with little thought for their relation with each other. The student of John Donne's poetry, the student of the learning curve, the student of Soviet economy, the student of the structure of the atom—each gives little enough attention to what the others are doing, and none at all to any total picture of anything. Each has his own goals, his own methods, his own language for talking about what he is doing and what he has discovered. Each seems happiest when left to his own devices, glad indeed if he can keep the others from treading on his toes. Each is convinced that what each himself is doing is worthwhile. But none has too

[5] Our universities have been, and are increasingly becoming, a wonderful mixture of cohesive, individualistic, and occasionally, anarchistic forces.

> much respect for the others, though he is willing enough to tolerate them. They have all little understanding of each other's pursuits—what they are trying to do, how they are doing it, and what they really mean when they talk about it. And lacking understanding, and the very possibility of communication, neither they, nor it would seem anyone else is in a position to appraise the respective importance of what each is doing. Its importance for what? The question gives us pause, for it seems to take us beyond all these manifold pursuits of special knowledge.[6]

Professor Randall's criticism was expressed in somewhat different words but with the same enlightened passion by Richard Hofstadter and his co-author in a book published in 1952, and entitled, *The Development and Scope of Higher Education in the United States.*

> There is at present a serious breakdown of communication between specialist and specialist, an iron curtain that in the academic world is as serious as it is in international affairs. Minds are not making contact with minds, they do not speak the same language. . . . We know more than we have ever known, and we shall soon know still more. That is all to the good; there can be no halt to the advancement of knowledge. Our calculation, however, . . . has outrun our conception. We lack the creative faculty to imagine that which we already know. There is no assurance that man will succeed in harmonizing his knowledge, but the gains that will come from a common effort to do so seem scarcely open to argument—the gains in the depth, breadth and grasp of what we know, in the fellowship of shared understanding and unselfish purpose.[7]

A most pessimistic observation on this subject was made in 1923 by John Burnet, Fellow of the British Academy, on the occasion of the Oxford Romanes Lecture. The title of his paper was "Ignorance." He reminded us that in the mid-19th century, James Frederick Ferrier, St. Andrews Professor of Moral Philosophy, invented the word "epistomology," meaning theory of knowledge. This turned out to be a popular and useful word.

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[6] John Herman Randall, Jr., "Unifications of Knowledge: What is the World to be Unified?" in *The Unity of Knowledge*, ed. Lewis G. Leary (Garden City, 1955).

[7] Richard Hofstadter and C. DeWitt Hardy, *The Development and Scope of Higher Education in the United States* (New York, 1952).

But, Professor Burnet continued, Ferrier invented a companion word at the same time, the word "agnoiology," meaning, theory of ignorance, and apparently Ferrier had argued that you can not have one without the other. This extraordinarily cumbersome word has generally been overlooked and has tended to disappear from our dictionaries. Mr. Burnet, making no serious effort to reintroduce the word into our 20th century vocabulary, did proceed to paint a rather gloomy picture of our learned world based upon Ferrier's twin terms. Burnet wrote as follows:

> Now it is plain that no one can possibly know more than a fraction of what is worth knowing. It seems rather that the more there is to be known, the less of it can we know, so that the growth of what, for anyone of us, can only be potential knowledge, is necessarily to the same extent a growth of actual ignorance. Our knowledge bears a diminishing proportion to the mass.[8]

Then, unexpectedly, Burnet came close to visualizing some of our fondest present-day hopes in respect to computer tape storage of all knowledge in some central depository, only to end in pessimistic rebuttal of the value of such an accomplishment.

> Libraries and museums are the great storehouses of potential knowledge; but, if all possible knowledge were duly stored up in the Bodleian and the British Museums, what would it profit us? The very existence of such an accumulation would discourage the best of us.[9]

At this point, Burnet showed signs of becoming exhausted from these morbid thoughts and concluded them in this fashion: "What is the use of trying to make some fraction of the mass our own, when it can only have an infinitesimal ratio to the whole, and when it will be distorted besides by its detachment from the context which alone can make it intelligible?"[10]

These quotations on the state of knowledge hopefully illuminate rather than darken the background of this paper. Although they certainly remind us of the many accomplishments of the new scholarship, they also suggest some of the pressures

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[8] John Burnet, "Ignorance" in his *Essays and Addresses* (New York, 1930).

[9] *Ibid.*

[10] *Ibid.*

these very accomplishments exert upon present-day universities, present-day scholarship, and present-day research libraries.

There have been, as a result of these and similar criticisms, serious efforts made in the past ten years to find answers to the questions they pose. Great energy has been expended in this period to reappraise the aims and purposes of our universities and to answer, somewhat more meaningfully, for this and the oncoming generation, the question, "What is a university?"

It is fitting that some of these efforts have borrowed from the methods of a science that first saw the light of day in the 19th century at the time the new scholarship was revolutionizing college campuses. Psychiatry, invented to provide therapeutic treatment for mental and emotional ills of individuals, has, in the past decade or so, been adapted to the treatment of group tensions. Our universities have also adopted this relatively new science to their own corporate bodies. They have established Long Range Planning Committees, a variety of Curricula Committees, Committees on Committees, and have hired numerous experts and consultants to help explain our scholarly communities to themselves. In a very true sense universities have taken to the corporate couch in an effort to answer the question: "What is a university, what should its academic program be, what its library?" We would probably all agree that the experience has not been without its moments of classical comedy, and yet, I suspect, that this analysis and self-analysis is a sign of life, even good health. This is probably true even though university communities caught up in these persistent probings experience some agonizing moments.

The new scholarship, being research oriented, has added dramatically to our storehouse of the printed record. "Some three million articles on scientific and technological advances [alone] are published in some 35,000 journals in more than 60 languages each year, and the rate of discovery and of publication is increasing—doubling, according to one estimate, every 15 years." [11] I must admit that there are moments when Mr. Burnet's pessimism afflicts me.

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[11] Lawrence Sandek, "Man's World of Facts," *Data Processor, X* (November, 1967).

The modern researcher, almost regardless of his field of interest, has been driven to ever more specialized burrowing along narrowing veins of the intellectual ore. These labors have, as we know, greatly expanded the frontiers of knowledge. But as the writers, quoted earlier, remind us, there is some danger that all these specialized intelligences may not necessarily add up to a meaningful whole. And many of the articles and books dealing with universities and graduate education that have issued from our presses in the past 20 years have urged us, as did Randall, Hofstadter, and Burnet, to find ways of creating larger syntheses out of the specialists' findings; to develop, in our universities, along with these special knowledges, a more generalized intelligence.

There are indications that there are some very practical as well as philosophical considerations pressing us in this direction. There is growing evidence that many subject specialists themselves find it necessary to think more and more in terms of partial or extensive integrations, cross fertilizations, of their fields with others. I would suggest that this movement in our universities toward some sort of integration of subject fields, formerly considered distinct, represents more than a short-term fashion in learning. If, as I suspect, it indicates a practical necessity to evolve a more meaningful whole out of all our special knowledges, then major changes will probably occur in the structure of our universities, in their traditional departmental arrangements, in their curricula, and in the libraries that attempt to serve scholarship. There is evidence that some of these changes are already beginning to occur.

These two forces: (1) specialization, and (2) synthesis, are not necessarily compatible. Actually, they frequently seem to come into conflict. None of us can foresee the future of our universities except, perhaps, dimly, but I believe that more and more of our internal dialogue and debate will relate in some fashion to the problems posed by this apparent dichotomy.

Only an idiot would argue that specialization has run its course, so the problem becomes one of developing a philosophy, a structure, and the methods that will permit our universities to achieve a somewhat more reasonable balance between these two forces.

The conflict has already contributed to the tensions of the scholar-research library marriage union. This can be illustrated by a number of examples. I submit only a few.

By the close of World War II the great majority of our universities had evolved library systems that were generally centralized for administrative purposes and decentralized for service. The departmental library system that had been introduced some years before to serve the new scholarship was, by 1945, the most typical, the most popular library arrangement in the country. Rather suddenly, a new useful educational technique, which had been devised during the war to help speed victory, made its appearance on many of our larger university campuses. This was the area study program with its institute. The phrase area study rather successfully describes the purposes of these new programs. Those sponsoring them were interested in studying major regions or areas of the world from a variety of directions, and by involving a variety of subject field specialists to achieve this. Those sponsoring a Russian, Far Eastern, or Latin American Institute were interested in bringing all available materials relating to these areas, including literature, economics, geography, sociology, etc., together. Sometimes these new institutes went outside of their universities to attract faculty, sometimes they lured subject specialists from departments on campus, and sometimes they shared a scholar with his original department.

Whatever the mechanics of these arrangements a new service pressure was exerted upon the university library. Some area study directors expressed the desirability of establishing a special library into which all the materials relating to his institute's interests would be brought. This seemed a reasonable request by the man or group recommending it. Nevertheless individual departments continued in existence, departments of literature, economics, geography, sociology, etc. Generally the faculty attached to these departments expected the materials in their specialty to be kept together, did not wish to see Russian economics separated from U.S. or European economics. Frequently a library could not fully satisfy these somewhat disparate interests, and decisions were made that left a bad taste in someone's mouth.

Another development encouraging tension in the marriage union of scholarship and the research library became particularly apparent in the 1950's. It was this time that witnessed the burgeoning of the hyphenated sciences. Programs were introduced in bio-physics, bio-chemistry, bio-medical engineering and many more. Out of fields formerly considered distinct, at least in respect to the academic structure of our universities, came new combinations, partial or extensive consolidations. The list of these combinations grows longer each year and actually some of the newer ones have done away with the need for a hyphen. Environmental engineering provides an example of this for it may draw upon sanitary engineers, oceanographers, meteorologists, and physicists or biologists. Frequently as these new groups are formed the old departmental structures out of which they emerged remain—not only remain but continue to pursue their interests actively. And so again it is only natural that if these new programs are given a home in some building, removed from the departments of their origins, a pressure develops upon the library to create new facilities to serve them. The pressure to maintain and continue to develop the parent departmental libraries generally does not slacken. And again, for perfectly good reasons, the scholarship-research library partnership faces a modest crisis.

There is, perhaps, another type of tension developing between the marriage partners, although the reasons for this one are not as easily understood. I can only describe it as a growing disenchantment on the part of some of our scientists concerning university libraries and their services. There is some evidence that librarians share this concern but I am not sure either partner has formulated, clearly in his mind, the scope and nature of the problem. I do know that as a librarian I have a sense of unease about this. I suspect that the large research library may be failing to satisfy even some of the important research needs of the scientist. In a sense our big research libraries are becoming archives of science and possibly slipping out of the informational and communication channels used by some scientists, particularly by those who are pressing at the outer boundaries of their discipline, busily engaged in exploring the scientific frontier that continues to beckon and excite the creative and venturesome mind.

An increasing amount of information relating to current and on-going scientific research is not being acquired by our libraries. It is obvious that some research scientists are making increasing use of the telephone, of personal meetings, pertinent intellectual gossip, and letter writing in an effort to keep abreast of their field. Little, if any, of the information exchange that occurs in this fashion finds its way into libraries, at least not until work in progress is finished. One of our historians of science claims that at least 2 percent of all of our present-day research scientist are members of these "Invisible Colleges."[12]

Even some of the more formal media of scientific communication are not easily acquired sufficiently quickly by our libraries. There is an increasing number of pre-conference publications (limited printings of papers to be presented at some forthcoming scientific meeting). These publications are generally sent out to the participants in advance of the meetings. They may not be generally distributed to libraries, where they could be made available to interested scientists and graduate students who are not invited to a particular conference.

How important are these documents? How important that libraries receive them and make them more readily available? We just do not know, and not knowing, we may exaggerate their value. We should have more facts, however. It may be that all that should be expected of the research library is to collect the more formal, the more traditional type of material (books, journals, technical reports, etc.). Perhaps it is proper that large libraries become science archives. But at this moment in history we not only do not know the answer to this question, we are not absolutely sure how best to pose the question. Even the viewpoints of scientists differ concerning its importance.

Whatever the answer, it is clear that the majority of librarians have very little knowledge of the work habits and communication patterns of scientists, even while attempting to serve their academic interests. And obviously the scientific community is growing rapidly. It is an awesome thought to realize that of all scientists who ever lived, 90 percent are alive today.

A study, attempting to investigate the communication patterns and work habits of scientists, is now being conducted at

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[12] Derek John de Solla Price, *Science Since Babylon* (New Haven, 1961).

The Johns Hopkins University. It is under the direction of Dr. William Garvey, a psychologist, and is composed of a team of science subject specialists. The study is being sponsored by the National Science Foundation.

It is our hope that this will end in being a useful study, and that it and others like it will help us in formulating some useful generalizations. Out of such studies we may gain new insights into ways of providing more effective library services to the scientific community.

One should not speak of present-day scholarship and research libraries without some reference to the new machinery. Although the initial exaggerated optimism, concerning the ability of the new machinery to solve all the major problems confronting large research libraries, has subsided, at least been tempered, by our first encounters with this new tool it is obvious that it does and will continue to play a vitally important role. I believe one of its real successes will be in such areas as the production of hard copy from a distance, whether this distance be measured from Knoxville to Washington, D.C., or from Tennessee's main library to one of the University's academic buildings. This is already possible but the machinery needs to be refined and reduced in cost. I sometimes suspect that the ability to call out, from some central or regional tape storage warehouse, citations, abstracts, and complete documents covering all the fields of knowledge that are pursued in universities will not be realized until after we have landed the first man on the moon.

I have dipped into the history of the partnership of 20th century scholarship and the research library. In examining this partnership I have felt compelled to give almost equal attention to the universities these partners mutually serve.

The sub-title of this paper, "A Marriage of Convenience," suggests, as I have noted, a less than ideal union. I believe this is an honest assumption to make based upon the evidence available to us. Yet in looking at a few of the difficulties that have beset the union, I have done so with sympathetic and empathetic eyes.

I am concerned whenever I discover evidence that the marriage is afflicted by the syndrome, common to our century, and best expressed in the phrase, "We and They."

In this rather frenetic age, filled with specialization, complexity, and a variety of pressures exerted upon the mind and spirit of man, it is not surprising that the syndrome grows.

In the midst of all this I consider it particularly important that the truly magnificent accomplishments of the partnership between scholarship and the research library be remembered, that they stand as a firm base for our discourse. I suspect there is a need for the partners to engage in more dialogue than the busy life of each readily encourages. The world of scholarship changes, shifts its emphasis quickly these days and large libraries are, at best, somewhat cumbersome beasts. But the partners must not let this 20th century syndrome I mentioned inhibit their relationship. There is a real need for creative critical discussion.

Some of this concern may seem exaggerated but I would be untypical of my profession if I did not speak of problems. Some of the problems we face seem to me to be formidable ones. I am not at all certain, for example, where all the funds needed to serve the ever increasing intellectual appetite of 20th century scholarship, will be found.

In addition to thoughtful discourse within our particular universities there is great need for even more imaginative inter-institutional cooperative programs. Much time and effort have already gone into devising such schemes, but much remains to be done.

Looming above all the problems, real or imaginary, it seems to me, is an opportunity, thanks in part to the potential of the new machinery, to involve ourselves in a new intellectual revolution, a revolution grander, perhaps, than that achieved by our forebears in the last quarter of the 19th Century.

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library lecture number twenty-one

UNIVERSITY OF TENNESSEE LIBRARY, APRIL 22, 1969

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Automation and the Academic Library

In 1964 the consulting firm Bolt, Beranek and Newman issued a progress report of a study funded by the Council on Library Resources which contains the statement, "In the library of the future, man will continue to read books, gain insights, think and make discoveries. But the library will do most of the searching, transforming, interpreting and checking of information he needs, and will thereby free him for more creative uses of stored information."[1]

These brief words of prophecy convey the essential excitement and promise that automation offers academic libraries today. Additionally, there is reassurance that although the library will be automated, the book will still be an important commodity in library operations. There is, however, no hint given of the anxiety that permeates any discussion of automation in academic libraries. It is not the intent of this paper to evaluate the prophetic wisdom of Bolt, Beranek and Newman although my acceptance of their forecast is implicit, but rather I wish to examine the relationship of automation and the academic li-

[1] *Toward the Library of the 21st Century*, a Report on Progress made in a Program of Research, sponsored by the Council on Library Resources (Cambridge, Mass.: Bolt, Beranek and Newman, March, 1964).

brary and discover, if possible, what to do until the millenium comes.

That anxiety exists is, I believe, a fairly safe assumption, although we have come a long way from the era where the anxiety was based on the belief that the computer would replace librarians. You may recall that condition humorously explored on Broadway in the mid-fifties in a play called *The Desk Set*, which starred Shirley Booth. Actually, man has through the ages viewed the growth of machinery, from the simple form of a stick used as a lever to our present era of "thinking" machines, with the question, "Is man master or slave of the machine?" The literature of the Western world has many examples of attempts to analyze and evaluate the relationship of men and machines, ranging from poetry and fiction to drama and essay. In fact, for those who are interested in pursuing this subject there is an excellent anthology of representative pieces under the title *Of Men and Machines*[2] which was recently reissued by Dutton in paperback form

The .andom House Dictionary of the English Language defines *misoneism* as "hatred or dislike of what is new or represents change." While all of us to some extent and in some situations exhibit symptoms of this affliction, I do not believe that resistance to automation on the part of some librarians is generally a reflection of this condition.

The anxiety is, I believe, based instead on the uncertainties and difficulties inherent in implementing any form of automation in academic libraries today. Being oriented to problem solving, library administrators in particular are plagued by our inability to move in a clearly formulated, straight line approach, step by step, toward well defined and precisely articulated goals. As we observe automation attempts in our colleagues' libraries and see the resulting confusion, the morale problems, the cost, the ever-slipping schedules for attaining goals, and most important, the minimal and sometimes questionable results when those goals are reached, we become mired ever deeper in the quandry of whether or not we should commit our libraries to automation at this time.

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[2] Arthur O. Lewis, Jr., ed., *Of Men and Machines* (New York: Dutton, 1963).

Much of the blame for this condition can be attributed to what Paul Howard of the Federal Library Commission has called the writing of "futuristic history." This tendency is closely allied with what I would, in my kinder moments, call the "optimism in advertising syndrome" of certain segments of American industry. In the field of aviation, we saw a prime illustration in the Boeing Company's elaborate claims for its SST design, which as we know, went back to the drawing board for complete redesign after the contract was awarded. In fairness to Boeing, it should be noted that aircraft manufacturers in this country have through the years tended to overstate the capabilities of aircraft still on the drawing boards and to advertise those aircraft as though they were already leaving vapor trails in the skies.

Similarly, a large number of librarians involved in automation efforts in this country have been afflicted with this syndrome to the detriment of the very field they are trying to advance. In referring to articles on library automation, Donald Black and Earl Farley have pointed out that "the most distressing feature of the literature is the failure of the writers to disclose what is actually operational and what is proposed or conjectural in the automation projects they describe."[3]

Fred Cole, President of the Council on Library Resources in his introduction to the Council's latest Annual Report says, "In the rhetoric of the automation enthusiasts it is easy to miss the qualifying word or phrase, if indeed such are used, and to suppose that all the technical and intellectual components of a system or systems are available and need only be assembled."[4]

While many of us were aware of this questionable and unscholarly practice, it required a public indictment of the condition as reported by Australian librarian Harrison Bryan in *Library Journal* to bring us up short. As he so colorfully expresses it:

> The way of the hapless venturer into the apparently well-charted sea of library automation is beset with shoals

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[3] Donald V. Black and Earl A. Farley, "Library Automation," *Annual Review of Information Science and Technology* (Washington, D. C.: American Documentation Institute, 1966), pp. 273-304.

[4] Council on Library Resources, *12th Annual Report* (Washington, D. C.: Council on Library Resources, 1968), p. 9.

and difficulties, because there is certainly less automation and more certainly less depth in automation than the charts (that is to say, the literature) reveal. Projects which have all the recorded confidence of operating schemes turn out to be projects indeed; systems reported in the full flush of initial optimism are found abandoned or modified out of recognition. Indeed, the literature of library automation is all too like those ancient maps which libraries of record, very properly, treasure. Like them, it is a highly colored production compounded of observed fact, with the observation clearly reflecting varying degrees of accuracy; and of conjecture, shrewd and otherwise; the whole being liberally larded with imagination. Like them it is often, one fears, more illuminated than illuminating.[5]

Ir a typically pithy article, Daniel Melcher describes this situation as follows, "The rules of the computer game are that you talk only about what you are *going* to do, never about how it turned out. This is a science in which you publish the results of your experiments before you make them."[6]

At every turn, we see practical evidences of the reality belying the promise. Libraries today face an increasing slowdown in the delivery of books whether ordered from publisher or jobber. While many complex factors may contribute to this situation, the increasing move of publishers and book jobbers toward automation plays a large role. As Dan Melcher puts it, "The tangible results of computerization as they affect the publisher's customers and authors are easier to identify. Computers have unmistakably lengthened the time it takes to fill an order, and have made it almost impossible to understand a royalty statement or get an intelligent answer to a complaint or query."[7] He goes on to say that, "Unhappily, the near term result often seems to be that information formerly available by means of a phone call to the order department is reported as unknowable until the computer makes its next periodic report."[8]

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[5] Harrison Bryan, "American Automation in Action," *Library Journal*, 92 (January 15, 1967), p. 189.

[6] Daniel Melcher, "Automation: Rosy Prospects and Cold Facts," *Library Journal*, 93 (March 15, 1968), p. 1105.

[7] *Ibid.*

[8] *Ibid.*, p. 1106.

In the same vein, computerized circulation systems in university libraries have introduced the "24 hour gap" in providing information on the day's transactions. Some libraries find it extremely difficult to keep to schedule and produce each night a print-out of the day's transaction so the record will be available the following morning. Indeed, other libraries regularly run as much as a week behind in providing this information. The consequent irritation, inconvenience, extra effort and delay caused staff and patron give little assurance to observers from other libraries. Thus as we observe the disparity between the promise and reality, we become somewhat dubious about committing our limited economic and staff resources to such programs when our present systems at least work.

Another major cause for hesitation on the part of librarians in regard to automation is the susceptibility of automated systems to restrictive machine requirements. These restrictions which might be labeled character traits, could include such categories as susceptibility to delay, inflexibility, and inhumanity.

We have already touched upon some of the facets which could be included under delay. Since present-day computerized library systems are almost universally off-line, they are subject to an evil (but economically and functionally necessary) practice called "batching." Delay is inherent in the term since, no matter how fast transactions are processed, they must all stop at this point and await a scheduled computer run. Thus, circulation information that formerly was available for immediate check, is now not available until the next day. Book orders that were formerly typed and mailed each day, must now be held for a once or twice weekly computer run to print out the purchase order. No matter what the computer speed is while actually doing these tasks, the end result is delay. The situation is somewhat analogous to a traveler on an airline. It matters not that he can speed along at 600 miles per hour while at 40,000 feet, if his travel time to and from the airport plus check-in waiting lines, and a pre-departure wait, accompanied by delays in baggage retrieval, account for time equal to that actually spent in the air. The net time savings, particularly on short stage trips, is likely to be at best insignificant.

The next restriction inherent in such systems is inflexibility. Probably one could not more coldly and explicitly describe this

condition than does the following statement from a report on an operations research and systems engineering study at Johns Hopkins, "For once personalized services there now must be substituted recognition that *every single transaction* must conform meticulously to the requirements of the system; there must be *no* exceptions. Those experienced in computer systems will at once understand the meaning of this inexorable demand."[9] This report, written by two operations research engineers repeatedly stresses the stringent requirements of an automated system.

The final restriction such systems impose is what could perhaps be described as inhumanity. One of my British colleagues on our staff who is a practicing punster, refers to this as a condition in which automation becomes automaton, dropping the "I" that is the characteristic of humanity. Under this heading we can include a wide array of undesirable characteristics. Computers obviously are totally lacking in intelligence. Thus whatever goes in wrong, comes out wrong. In the jargon of the computer field, this is usually expressed as "GIGO," meaning "garbage in, garbage out." For the consumer, unable to communicate directly with the computer, this can be a frustrating experience which all of you have shared at one time or another. My favorite personal experience involved a short term trial subscription to *Esquire* magazine some years ago, about at the time that magazine was establishing its computerized subscription service out in Boulder, Colorado. Thus, I checked a mail-in card for the trial subscription and as instructed waited for an invoice. The issues of *Esquire* began to arrive regularly and after some months I wrote for a bill. The long-range outcome was that I was neither able to get an invoice nor was I able to shut off the subscription. Consequently, after several vain attempts, I settled down to enjoy a long-term, free subscription to the magazine.

More recently the episode was reversed. Having by this time become a resident of Boulder, a friend of mine who was director of libraries at a midwestern university called on the phone one day in great agitation to request my help in resolving a frustration of about three years' duration. He had subscribed to another

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[9] *Final Report (No. 5) on an Operations Research and Systems Engineering Study* (NSF Grant GN-31). (Baltimore, Maryland: Johns Hopkins University, December, 1968), p. 26.

magazine being handled by the same subscription firm, which had by now become known as Neodata. He had been duly invoiced, paid his money and for three years continued to receive, at regular intervals, additional invoices dunning him for payment, but no issues of the periodical. After many but vain efforts to resolve the problem by phone and letter from the midwest, he had turned to me as a final resort in the belief that closer proximity offered a better chance for success. Indeed, success was finally achieved but only after a regular weekly phone discussion with a successively higher officer of the firm over a period of months.

At a recent computer seminar for library directors at IBM's San Jose Homestead, this matter was widely discussed. The IBM staff conducting the seminar imparted the useful hint that the solution to this kind of problem lies not in attaching a letter to the offending punched card invoice for it will usually be detached and discarded. Instead, they recommend punching extra holes or otherwise distorting the card and writing your message on it. Thus when the machine rejects the card—as it surely will—the message has a chance of being noted and acted upon.

Not only does the computer exhibit an inability to listen and respond to our frustrations, its moronic intelligence level combined with its power, give it a frightening capacity for error. We've all read stories of computers going on a spending binge and printing out million dollar pay checks to factory workers. Consider the implications of an article in the *Inland Printer* which reports that ". . . it would take 100 clerks working for 100 years to make a mistake as monumental as a single computer can make in 1/1000 of a second."[10] Melcher has reported how his computer assigned each subject heading to the preceding title in the production of *Paper-bound Books in Print* and thus succeeded in misclassifying 44,000 titles in one pass.[11]

In essence then, we face an age-old problem of adjusting to a new set of conditions which face us. How we resolve this problem will have enduring effects on us and on our profession. The answer is not to exhibit an empty reverence for the past and to shun the tools of our age as exemplified by William Morris. Mor-

[10] *Inland Printer*, January, 1969.

[11] Melcher, p. 1105.

ris, as we know, was a man of many talents, and much revered himself by the library profession as an author, poet, printer, book designer, and for numerous other talents. However, basic to his philosophy was the belief that only handcrafted products could achieve quality; that machine-produced goods were *per se* cheap and artificial. One gathers that he believed that the machine itself was evil.

On the other hand, consider the wiser counsel of Frank Lloyd Wright, who in his discourse on "Machinery, Materials and Men" offers us some fundamental wisdoms. Believing that the automatic machine is the essential tool of our age, he nevertheless warns that:

> There is not thrift in any craft until the tools are mastered; nor will there be a worthy social order in America until the elements by which America does its work are mastered by American society. Nor can there be an Art worth the man or the name until these elements are grasped and truthfully idealized in whatever we as a people try to make. Although these elemental truths should be commonplace enough by now, as a people we do not understand them nor do we see the way to apply them . . . We are one and all, consciously or unconsciously, mastered by our fascinating automatic "implements," using them as substitutes for tools.[12]

In referring to machines, Wright was obviously not talking about computers, but the fundamental truths of his writing have an important message for society today. Wright expressed, time and again, his concern at the misuse *of machines* which in turn resulted in *abuse by* machines with the consequence of human degradation. We see this concern expressed all about us, both on campus and by society as a whole. Humans do not savor the thought of invasion of privacy by computers, they do not desire to be increasingly treated as numbers on IBM cards, nor do they crave to have their behavior patterns increasingly based on restrictive machine requirements. Thus it behooves us to keep mindful of the human requirements of any automated system we may create.

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[12] Frank Lloyd Wright, "Machinery, Materials and Men," in *Modern Architecture, being the Kahn Lectures for 1930* (Princeton, N. J.: Princeton University Press, 1931), p. 7.

In overly simplistic terms then, one could summarize to this point by saying that librarians are wary of automation because of widely demonstrated failures and unhappy experiences with automated systems in all walks of life. But can we dismiss automation as lightly as this? I think not.

It seems to me that automation for academic libraries is an unavoidable element of our future. I hasten to add that though it may be unavoidable, it is not necessarily an evil, but that will be up to us. If we keep it oriented toward effective goals as well as continue to place a value on human dignity, automation can be of benefit to all.

What are my reasons for asserting that automation is inevitable? There are many, so let me list some of them, not necessarily in order of importance.

Librarians are as subject to their own times as anyone else. Thus all around us are pressures that move us toward this goal. Throughout our society, we see increasing evidences of the move toward automation on the part of professions, agencies, and institutions, and we do not wish to be left behind. A just released report from the General Services Administration, Federal Supply Service, gives some indication of the extent of this movement. In a four-fold growth, the use of computers by U. S. Government agencies jumped from 1,030 in 1962 to 4,232 at the end of June, 1968. The Federal government spent $1,662 million on EDP services in 1968, up from $595 million in 1962. Government employees devoted 118,905 man years of effort on EDP-related activities during this year.[13] While the totals are probably outside the realm of our understanding, the trend is significant.

As another aspect, we see the growing evidence of outside agencies such as information centers, who would, under any name, move into areas we have always considered proprietary and take over and offer some of our traditional services under the guise of automated services. Consider for example the proposal of Illinois Congressman Roman C. Pucinski for a national

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[13] U. S., General Services Administration, Federal Supply Service, *Inventory of Automatic Data Processing Equipment in the United States Government*, Fiscal Year 1968 (Washington, D. C.: Government Printing Office, 1969).

scientific data processing and information retrieval network aimed at providing American scientists with "instantaneous access to all published material in their fields."[14] Unlike his similar proposal of 1963, this approach visualizes a decentralized network of regional centers including those presently operated by the National Science Foundation plus private and university operated centers. Quite obviously, librarians have no desire to block any effort to improve the flow of information to any segment of our society, but we do feel it is necessary to be a part of that system. Failure to do so can only relegate libraries to a passive, archival role. However, before academic libraries can become participants in such schemes, we shall have to demonstrate the necessary knowledge and capabilities for utilizing and participating in such systems.

Another facet of this push toward automation is our continued exposure to the propaganda of hortatory articles and lectures, perhaps including this one, which insidiously undermine our proper scepticism by reflecting an often unwarranted optimism for automation.

Another factor moving us onward is the community pressure we are subjected to, particularly from some university faculty and administrative officers, who, in an often surprising naïveté, are quick to point out to us that we could *solve our problems if we would but automate our libraries.*

Also important among these conditions is the increasing scope and sophistication of technological development, which when related to the growth of library financial resources will increasingly direct technological development efforts toward meeting our specific needs. An indication of the speed of this technological development is revealed in a recent article by William Smith in the *New York Times* which discloses the way the fourth generation computers are already pushing at the heels of those of the newly developed third generation.

Not least of the pressures, however, is our own keen awareness of the need to do better those things we have always done and to greatly widen the scope of services offered. We recognize

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[14] "A National Scientific Data Processing and Information Retrieval Network," *EDP Weekly*, February 24, 1969, p. 2.

that in order to offer this wide array of services it is going to be necessary to reduce the amount of staff dollars we presently must commit to processing of materials and to other housekeeping functions. Only then can we utilize our staff for the positive services that will help us to establish our place in the educational community. Moreover, we have a growing awareness of a need for "management information" not now available, yet increasingly necessary to permit us to plan and to operate with optimum effectiveness.

As Fred Cole expressed it, "In sum, the new technology is expensive and uncertain, both the research and development and the equipment. Nevertheless, library problems will worsen and the remedies grow more costly if the subject of automation is neglected today."[15]

If my assumption that automation is inevitable has validity, then what are we to do about it? I would say, quite seriously, "Let's stay calm and don't panic!" Let us not rush out and start an automation project so we can point with pride and say, "See, we are doing something." If this sounds somewhat asinine, let me suggest that there are libraries who have followed just such a course.

I believe that the words of Frank Lloyd Wright, earlier quoted, offer sage advice that we would be wise to keep in mind as we develop the basic objectives of automated library systems.

Application of these thoughts to our present condition emphasize our need to refine our knowledge of library operations and librarianship, to learn all we can of systematic methods of operations analysis, to learn all we can of systems design, machine technology, and machine applications. We must avoid a fascination with machines as an end in themselves in order that we may avoid subsequent abuse by these machines. Most important, we need to be mindful of human dignity when designing our systems.

In practical terms then, where and how does a library start on this long, rough, and but poorly mapped road leading toward an effective automated system? Obviously the limits of this paper permit only the barest outline of this involved topic.

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[15] Council on Library Resources, *12th Annual Report*, p. 10.

First let me say that I believe that the time to start is now. The place to start is in pre-planning. This means that in the initial stages one should forget hardware entirely and concentrate on the establishment of objectives. In my judgment, there are a number of vital factors which must be included in this pre-planning stage.

The first is to involve the whole staff in the planning process, both for information gathering and for educational purposes. The goals and objectives *must* be determined by the library staff. However, once broad objectives are defined, it will be desirable and even necessary for all involved to gain some knowledge of automation and then to intensively study the library's present processes and operations before proceeding to a systems design. A systems analyst should be employed as early as possible (preferably one with a library background, although this is not essential). Desirably, he should participate in the pre-planning discussions, but *never* should he be allowed to determine the goals. His function should only be that of the technician recommending alternative approaches to achieving these goals. Failure to heed this policy has created some exceedingly difficult morale problems at a number of libraries and has at the same time created some systems which were ineffective and unacceptable to the staff. Given a system which fails to provide needed information and services, a practice known in the trade as "bootlegging" will occur. This involves the establishment of unauthorized files or processes, designed to provide information or services formerly available but not provided by the new automated system. Obviously, this practice tends to negate some possible savings which might be achieved by automation.

Another important precept is to establish a goal of an integrated total system. This does not mean that one will begin on inauguration day with a complete system, but each part can and should be planned as a modular unit of what can ultimately become a total system. In fact, I would suggest that it would be desirable to select limited goals initially, so long as the modular approach is kept in mind, and let the staff learn and gain confidence by doing. In specific terms, it is important to plan on utilizing any and all input data for subsequent and alternative uses without having to redundantly input that data again. This is an area where pre-planning is particularly vital.

Many libraries have started automation as a series of separate functions. Whether their first effort was in serials, acquisition, circulation, or cataloging, not enough attention was given to later integration of these systems. The frequent, unhappy consequence was that the data input was not sufficient or not properly formatted and tagged to permit retrieval and use in the variety of ways necessary to an integrated library system. As a result of these failures many librarians have found it necessary to start at the beginning and redesign, or worse, re-do all of the input that costs so much in time and expense.

Since the first MARC tapes for English language American titles are now available to library customers, it is essential to relate to this format to effect savings on input costs. Expansion of the MARC program is anticipated in the near future. Work is also going forward on serials information through the National Serials Data Project. Such machine readable input can mean vast savings for libraries in the future if we are prepared to take advantage of the information made available to us. Let me stress that the most vital element of an integrated system is the input data, its contents and organization. If the approach to a master file with tags for each portion of information is carefully conceived, then the needed information for each function can be retrieved and manipulated as desired. If this element of a systems design is successful and one can avoid re-formatting and re-inputting the data base, other problems, such as rewriting programs, are relatively simple and inexpensive in comparison.

The third very important decision area in pre-planning could be misconstrued as a choice between off-line and on-line systems but is not actually that. Instead it is the choice between punched cards and teleprocessing directly onto tape. Most libraries started with punched cards because there was little alternative at the time, or because it was (and still is) possible to rent in-house data processing equipment, such as key punch machines, collators, sorters, verifiers, and printers for relatively low monthly charges.

Unfortunately, cards are not the most efficient medium for library operations and the various pieces of equipment which process cards are slower and far less versatile than tape. In the last few years, teleprocessing equipment has been improved and

developed to a state that it can be strongly recommended over card equipment.

My own library has files that consist of hundreds of thousands of cards containing information that is not readily available to the staff, for two reasons. The equipment to input, to sort, and to print out is in a separate area of the library, but more important, it is operated by specialists such as key punch operators, who are committed to daily routines, and who cannot stop what they are doing whenever a staff member comes in for special information. It is obvious that, due to the nature of card systems and equipment, it is quite impossible to provide a custom run, or search, of those files for each member of the staff who needs information. No matter how carefully operations are planned, there are going to be situations where the staff is unable to get at such needed information when the medium is a punched card file.

On the other hand, teleprocessing terminals in a variety of styles may be used for both batch processing and on-line processing. Such equipment is faster and easier to use and most important, provides far greater facility for correcting and updating records. We all hold to the widely taught library school theory that catalogers should be allowed but limited access to a typewriter since they are employed to catalog not type. Yet, I question the extent of separation between the cataloger and the keypunch operator who is going to input that vital bibliographic record into the computer. How much better it would be to include teleprocessing terminals with cathode ray tubes for display and permit the cataloger either direct input or at least the opportunity to review what has been input by the typist. I might add at this point that some IBM terminals are identical to their Selectric typewriters with the exception of one switch which permits operation as a terminal or as a typewriter. This obviously eliminates the special training of operators that is so necessary with keypunch machines.

Some operations such as cataloging need not be on-line and can therefore perform input in a batch mode, although I stress this should occur right in the catalog department because of the quality control implicit in doing it there.

This brings us to the fourth very important aspect of pre-

planning, relations with other university agencies and particularly the computer center. Many universities have at least two computer centers, one for research computation and one for administrative purposes. Prior to any attempt to *establish* automated processes in the library, it is advisable to negotiate with top level university administrators as well as with computer center administrators to clearly establish the needs and priorities of the library both for funding of this project and for access to facilities. Generally speaking, research computation centers have a different philosophy of operations that does not take into account the ongoing needs of a library system, particularly in regard to schedules. On the other hand, administrative computer centers generally give higher priority to such functions as payroll and registration. Therefore, a clear statement of commitment to the library's programs, preferably in writing, is a necessary prerequisite to library automation. The alternative is that the library may find itself constantly bumped from its schedules in favor of other jobs.

Having established objectives and a general design outline, it is then necessary to establish a staff to undertake the detailed analysis preliminary to specific system design. Automating a library (which has not yet been achieved in total by any academic library) is still obviously somewhat of a pioneering effort, and in any event, a very time consuming undertaking. In spite of his interest, it is doubtful that any academic library director can free enough of his time to devote full attention to this vital project. Thus, a knowledgeable senior librarian with sufficient rank for the role of project director is to be recommended. That this person should be philosophically committed and mentally adaptable to automation goes without saying. A systems analyst has already been mentioned as a necessary addition to the staff. At least one programmer and likely more will eventually be needed. Terminal operators (not key punch operators as discussed above) will be needed, the number depending on how fast the project is to move. Since one cannot expect to abandon present systems until the automated systems are designed, tested, debugged, and operated provisionally for some time, it should be recognized that all costs, including staff, should be budgeted as an addition, not as replacement of any existing operations.

Quite likely this sounds like a massive and expensive undertaking and it is. Yet it is an accomplishment which is not only possible, it is essential to the well being of our professional future. It is my personal judgment that this step is necessary to a future that will permit libraries to reduce our excessive expenditures for processing and housekeeping operations, to ultimately reduce the capital outlay for buildings to house an ever growing flow of publications by greatly increased institutional sharing of resources through networks, to permit offering information and services beyond the walls of the library to the user where and when he needs them, and finally, and perhaps most important, to take our place in the academic community as a positive, direct, and vital participant in the educational function. Let me refer again to the opening statement of this paper, "In the library of the future, man will continue to read books, gain insights, think and make discoveries. But the library will do most of the searching, transforming, interpreting and checking of information he needs, and will thereby free him for more creative uses of stored information." I believe that's a future worth aiming for and I believe now is the time to start planning for it.

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No. 18. Library Interaction and Interdependence, by Stephen A. McCarthy.

The lectures have been published in groups of three. The first volume was published in 1952 as Volume 55, no. 1, of *The University of Tennessee Record;* the second volume was published in 1954 as Volume 30, no. 6, of *The University of Tennessee Record, Extension Series.* Beginning with no. 7, the lectures have their own series, *University of Tennessee Library Lectures.*